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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,976	09/30/2003	Richard William Glew	BTW-014	7682
959	7590	09/12/2005	EXAMINER	
LAHIVE & COCKFIELD, LLP. 28 STATE STREET BOSTON, MA 02109			SMOOT, STEPHEN W	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/676,976

Applicant(s)

GLEW ET AL.

Examiner

Stephen W. Smoot

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3-14 is/are allowed.
- 6) ☒ Claim(s) 1 and 15-17 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National-Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office action is in response to applicant's amendment filed on 21 June 2005.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 16 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The applicant's original disclosure as filed on 30 September 2003 does not provide support for the feature "whereby during the growing step, deposition species deposited on the mask migrate from the mask to adjoining mask areas" as claimed in newly added claim 16.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Urakami et al. (US 6,406,982 B2).

Referring to Figs. 8A-8D and column 14, line 35 to column 16, line 28, Urakami et al. teach a method of filling a trench with epitaxial silicon that includes the following features:

- A mask oxide (102) is used to define trenches (103) in a silicon substrate (101);
- An epitaxial film (106) is formed over the silicon substrate (101) by a single LP-CVD step to fill the trenches (103) such that the epitaxial film is thicker over the trenches (103) than elsewhere on the substrate (101);
- The epitaxial film (106) is flattened to the top level of the substrate (101) as shown in Fig. 8D by removing the epitaxial film above the trenches (103); and
- Wet or dry etching methods can be used for the flattening step.

These are all of the limitations set forth in claim 1 of the applicant's invention.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rice (US 3,574,008) in view of Urakami et al. (US 6,406,982 B2).

Referring to Figs. 1a-1e and column 3, line 16 to column 4, line 63, Rice discloses a method of selectively growing epitaxial silicon that includes the following features:

- Openings (14) are formed in a silicon dioxide layer (12) to expose selected areas of a wafer (10);
- Epitaxial silicon (20) is grown over the wafer (10) in a single growth step;
- The epitaxial silicon (20) is mushroom shaped with a larger thickness directly over the openings (14) than elsewhere on the wafer (10); and
- The epitaxial silicon (20) is subsequently flattened as shown in Fig. 1e resulting in a first thickness corresponding to the openings and a second thickness corresponding to elsewhere.

These are limitations set forth in claim 15 of the applicant's invention.

However, Rice does not teach or suggest etching to flatten the epitaxial silicon (20), which is a limitation set forth in claim 15 of the applicant's invention.

Urakami et al. teach that either dry etching or wet etching can be used to flatten an epitaxial silicon film (see column 14, lines 17-29).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Rice by substituting an etching step, as taught by Urakami et al., in order to flatten the epitaxial silicon of Rice. Urakami et al. recognize that etching is an alternative way to flatten epitaxial silicon (see column 14, lines 25-26).

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Urakami et al. (US 6,406,982 B2) as applied to claim 1 above, and further in view of Tihanyi (US 5,438,215).

As shown above, Urakami et al. anticipate claim 1 of the applicant's invention. However, Urakami et al. do not expressly teach or suggest growing another layer on the wafer after the step of etching, which is the further limitation to claim 1 as set forth in claim 16 of the applicant's invention. Instead, Urakami et al. teach that their trench filling method can be applied to the manufacture of power MOSFETs (see column 14, lines 47-49) and Tihanyi teaches a power MOSFET method featuring embedded epitaxially-filled trenches that includes depositing epitaxial material in trenches (11, 12) and subsequently covering the filled trenches (11, 12) with epitaxial material (see Fig. 1 and column 3, lines 46-62).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Urakami et al. and Tihanyi in order to incorporate the trench filling method, as taught by Urakami et al., into the power MOSFET method, as taught by Tihanyi. Urakami et al. actually suggest that their method can be incorporated into the method of Tihanyi (see column 14, lines 47-49).

Allowable Subject Matter

8. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form to include all of the limitations of the base claim and any intervening claims.

9. Claims 3-14 are allowed.

10. The following is a statement of reasons for the indication of allowable subject matter:

- Claim 2 would be allowable because the prior art of record does not teach or suggest, in combination with the other claim limitations, a method of forming a layer in a selected area on a wafer in a single growth step that includes the steps of growing a layer with a thickness that is greater in a selective area growth region than it is elsewhere on the wafer and etching the layer to leave a thickness of the layer in the selective area growth region while removing the layer

from elsewhere on the wafer, wherein the growth step is a metalorganic epitaxial CVD method;

- Claims 3-14 are allowed because the prior art of record does not teach or suggest, in combination with the other claim limitations, a method of integrating optical devices on a wafer that includes the steps of growing an optical device layer with a thickness that is greater in a selective area growth region than it is in an adjacent planar region and etching the optical device layer to leave a thickness of the optical device layer in the selective area growth region while removing the optical device layer from the adjacent planar region.

Response to Arguments

11. Applicant's arguments filed 21 June 2005 (see pages 7-10) have been fully considered but they are not persuasive.

Regarding the above rejection of claim 1 under 35 USC 102(b) as being anticipated by Urakami et al., the applicant argues (see page 9) that Urakami et al. lack the as-claimed feature "the selective area growth region having a growth enhancement ratio of greater than one" (see lines 4-6). However the as-grown epitaxial layer (106) of Urakami et al. is much thicker over the trenches (103) than over the rest of the silicon substrate (101) as shown in Fig. 8C. Accordingly, the growth rate of the epitaxial layer in the trenches is greater than the growth rate of the epitaxial layer outside the trenches

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or, in other words, the growth enhancement ratio is greater than one, based on the applicant's definition (see specification, page 10, lines 7-9).

Regarding the above rejection of claim 15 under 35 U.S.C. 103(a) as being unpatentable over the combination of Rice and Urakami et al., the applicant argues (see page 10) that this combination lacks the as-claimed feature "the selective area growth region having a growth enhancement ratio of greater than one" (see lines 5-6).

However, for the same reasons as the above explanation based on Urakami et al., Rice also teaches a growth enhancement ratio that is greater than one.

Conclusion

12. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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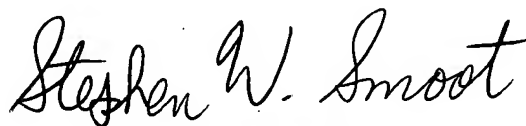
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on M-F (8:00 am to 4:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached on 571-272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SWS

A handwritten signature in black ink that reads "Stephen W. Smoot". The signature is written in a cursive, flowing style.

**STEPHEN W. SMOOT
PRIMARY EXAMINER**